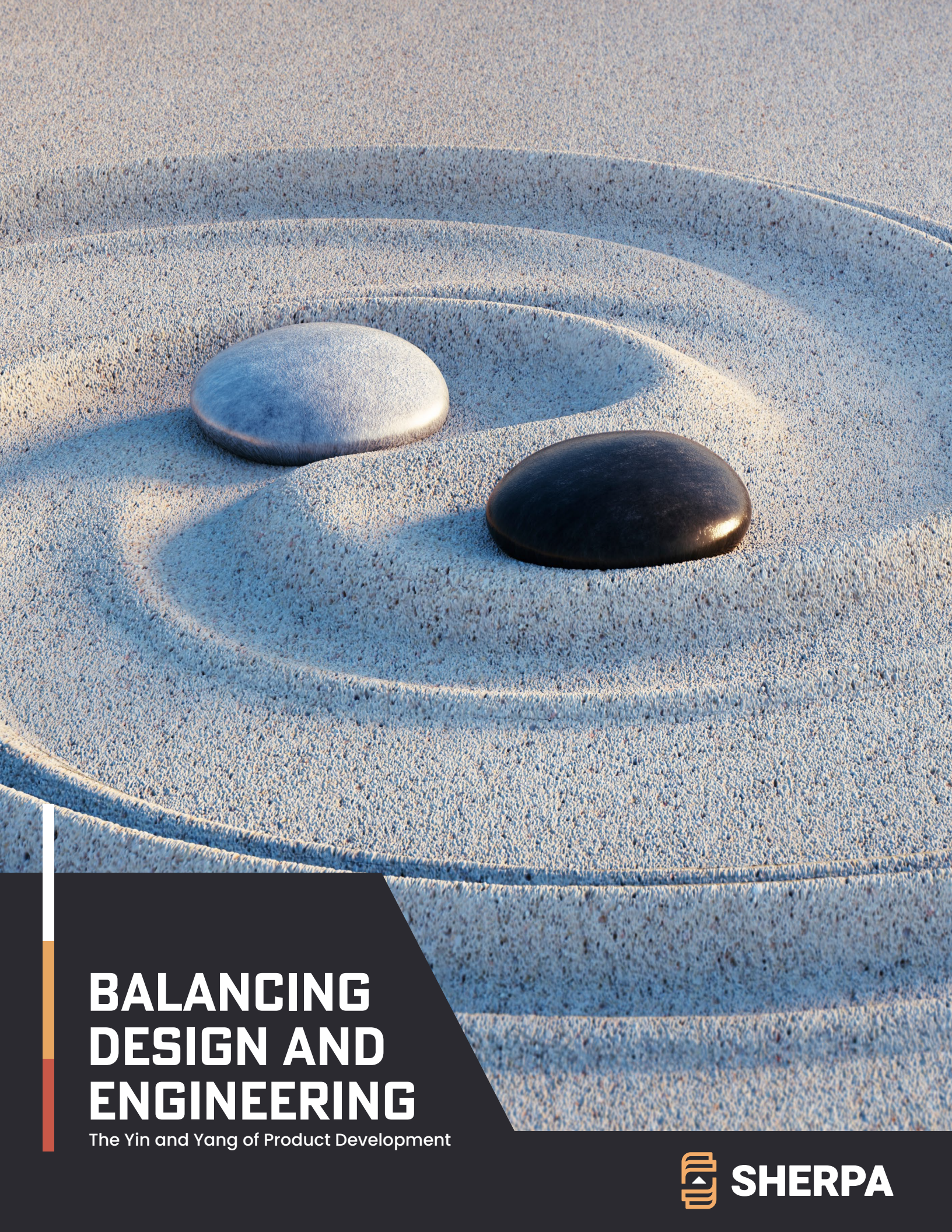


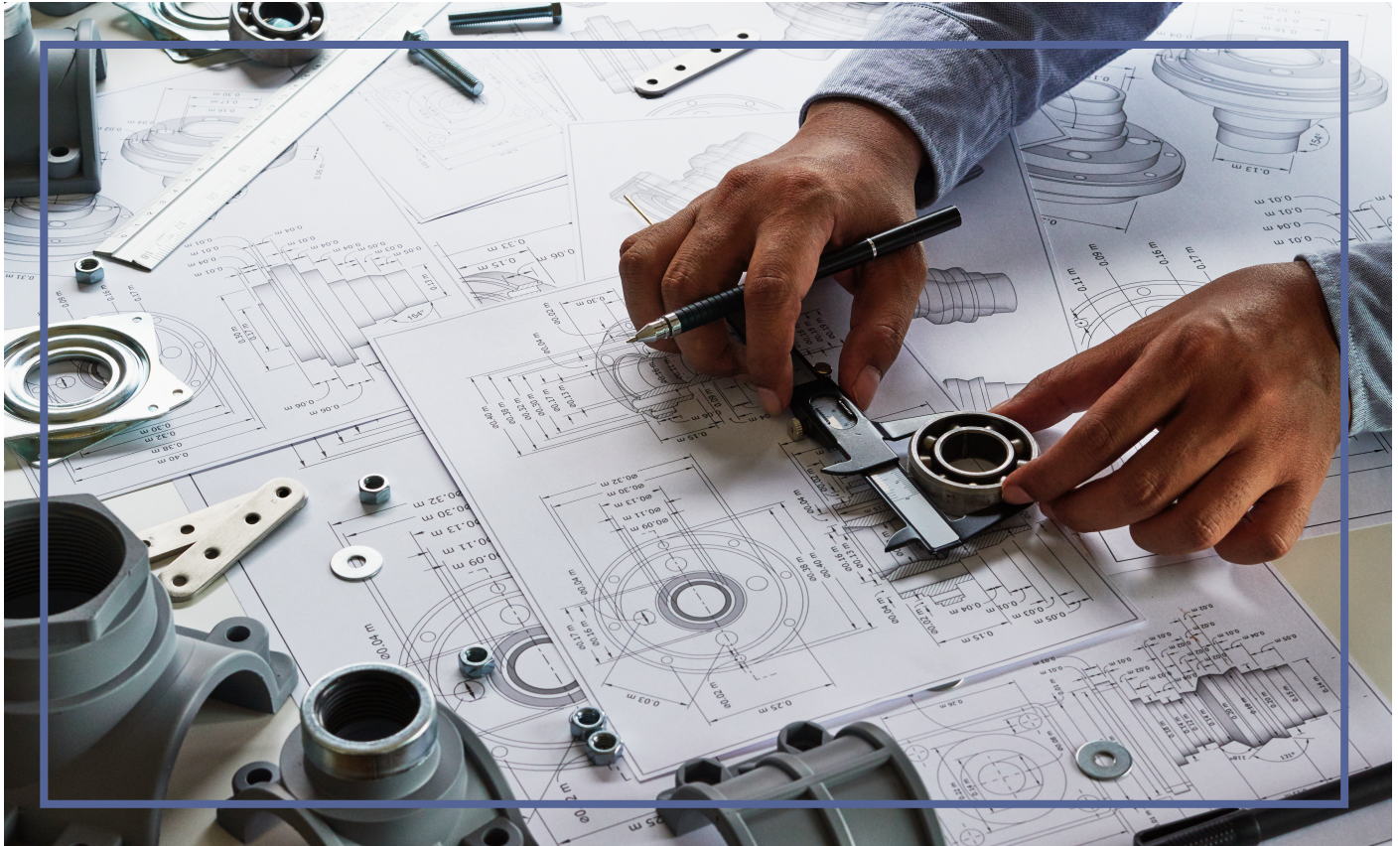
A photograph of a Zen garden featuring two smooth, dark, oval-shaped stones resting on a bed of light-colored sand. The sand is meticulously raked into concentric, wavy patterns that radiate from the stones, creating a sense of harmony and balance. The lighting is soft, casting gentle shadows and highlighting the textures of the sand and stones.

BALANCING DESIGN AND ENGINEERING

The Yin and Yang of Product Development



SHERPA



INDUSTRIAL DESIGN AND MECHANICAL ENGINEERING WORKING TOGETHER IN HARMONY

Yin-yang is a Chinese philosophical concept that describes opposite but interconnected forces. This pretty much sums up the relationship between industrial design and mechanical engineering.

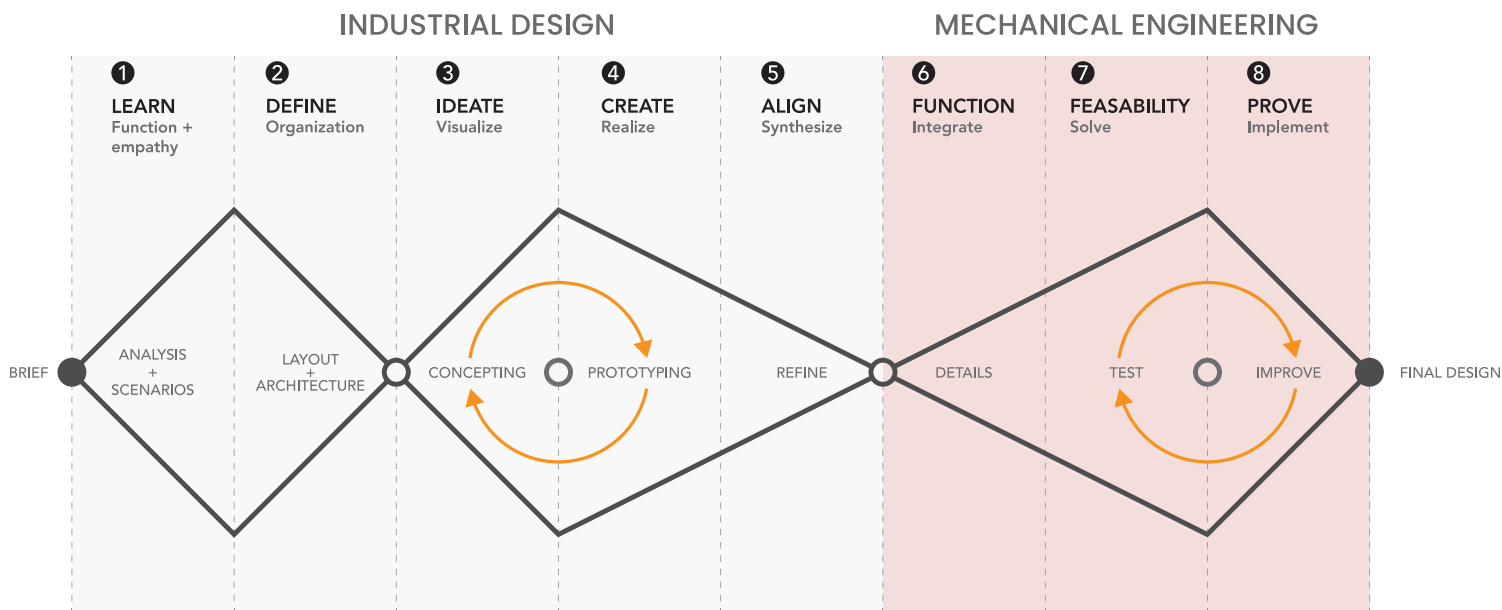
Industrial design (ID) is the yin, concerned with how things look and how people experience a product; industrial designers lie on the spectrum somewhere between artist and engineer, and individual designers operate anywhere along that spectrum. Meanwhile, mechanical engineering (ME) is the yang, dealing with the technical and functional aspects of making a manufacturable product. In a balance of form versus function, there's going to be some headbutting; however, both

are needed to create innovative and well-designed products.

When a company sets out to create a new product, they usually hire out the industrial design to an outside firm or consultant, who produces a design concept and creates a vision for what the final product will look like. It's then up to engineering to cram whatever parts go inside and handle the manufacturing details — sometimes the industrial design concept can't fit all of the parts, or maybe it ultimately isn't as manufacturable as believed. On top of that, these are usually either different companies or departments, and it starts to become obvious why the two can have such disdain for each other.

There's an area of overlap in the handoff from ID to ME where things become pointed. When designers pitch grandiose design concepts to a roundtable of seasoned engineers, what are some manufacturing or cost points that will turn their heads? When an engineer receives a good-looking but problematic design concept from a naïve industrial designer, how can they be guided in the right direction without compromising their vision?

With Mechanical Engineering and Industrial Design under one roof at Sherpa Design, we've encountered these problems from both perspectives and have identified a few ways to streamline the ID/ME handoff.



1. Align with engineering at the beginning of the project.

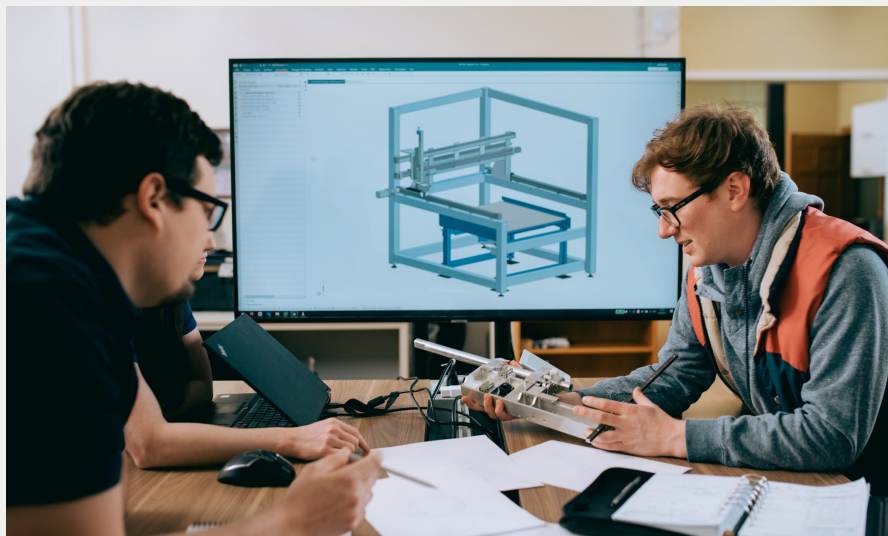
When a project kicks off, we usually have a roundtable discussion between design, engineering, and management on what each of our expectations are going into the project, what challenges we anticipate, and what our initial thoughts are. We start with identifying materials and processes appropriate for the intended use case and the project budget, and verify any design constraints with our client. Engineering starts by researching internal components and providing a list of parts needed for the project, while industrial design takes a preliminary look at ergonomic factors; ME and ID then come together to create concepts for the internal architecture of the product, so that ID can start to concept around layouts that take into account the user interface, serviceability, and manufacturability at the very start. This is a real luxury from an industrial designer's standpoint, since ID usually receives a preconceived layout from an external engineering group.



2. Bring engineering into the design process

When we go through our internal concept reviews, we bring our project engineers in to give their thoughts and opinions on our early concepts. We keep an open mind with their feedback, as it allows us to incorporate their functionality requirements into our ideation.

As ID moves through concept iterations, ME helps as expert witnesses by identifying manufacturability and assembly concerns early. Engineering becomes part of the creative process and gets to see how the sausage is made, which gives them a platform to raise their concerns and validation as part of the design development. Ultimately, the concepts we show to clients are reinforced with the backing of our engineers.



3. Review concepts with engineering

As we downselect concepts, we run our final few past engineering for their input on function, manufacturing, and assembly. This can help us make important decisions to identify potentially problematic areas early, and ensures that the work we show clients is backed by the confidence of our engineers.

After we've down-selected concepts and moved into final refinement, we compare an exterior surface model of the ID against the original internal architecture concept that ID and ME created together in CAD. This helps us find areas where we need to adjust for space claim, tolerances, and interferences. The critical part here is the required mutual understanding between the industrial designers and mechanical engineers.

It's essential for everyone involved in the product development process to shed their egos. Industrial designers are taught not to become attached to our ideas, so it's important for us to understand that even though the handoff to engineering marks the end of the ID phase, the design still isn't technically complete. In the case that something changes or there's a surprise in the technical details, industrial designers need to remain flexible and willing to get involved in the nitty gritty details to ensure that the core integrity of their concept isn't compromised.

This is where the services of separate ID and ME groups become convoluted; communication becomes complicated and design changes can get dragged out, so having both under one roof streamlines this final step of refinement.



4. Industrial design provides oversight

Once the design concept has been finalized, a finalized ID model is handed off to mechanical engineering for them to work their magic. For most industrial designers, the handoff represents the end of their contributions – whether it makes it through to production unaltered is entirely out of their hands. With ID and ME under one roof and usually just a short walk away, ID gets to stick around and provide oversight right up to the final manufactured parts. This gives industrial design the opportunity to help work through technical challenges that might come up, and help ensure that the original vision is preserved throughout the design for manufacture and assembly (DFMA) process.





In this way, engineering participates early in the design process, and industrial design is involved through to manufacturing. Because of engineering's early engagement in the design process, there should be very few technical issues in the design engineering development; however, when surprises do happen, ME and ID have enough rapport to come up with a solution together that not only solves the problem, but also preserves our design intent. In the process, ID becomes more knowledgeable of ME's needs and vice-versa. Over time, this has led to a group of

mechanical engineers that strive to meet ID's design goals, and industrial designers creating concepts with ME's manufacturing and functionality needs in mind from the get-go.

Just as yin-yang is represented as a black area and a white area in a circle, there are also two dots, representing that one is within the other. Balance comes when ID and ME collaborate closely and understand each other, and that's where great, innovative products are made.



NEED HELP WITH YOUR PRODUCT DEVELOPMENT JOURNEY?

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